

## CLAIMS

1. An information processing device for making communications through a communications processing device handling the communications, the information processing device comprising:

5       a bubble packet transmitter for transmitting a bubble packet via the communications processing device, the bubble packet being a packet for leaving a transmission history within the communications processing device; and

          a detecting packet transmitter for transmitting a detecting packet via the communications processing device, the detecting packet being a packet used for  
10       detecting a position of a bubble packet transmission port defined as one of ports of the communications processing device used for transmitting the bubble packet, the detecting packet transmitted in a manner that a detecting packet transmission port where the detecting packet passes through becomes the same as or different from the bubble packet transmission port, depending on a type of  
15       the communications processing device.

2. The information processing device according to claim 1 further comprising a destination data receiver for receiving a destination data defined as information on a destination of the bubble packet, wherein

20       the bubble packet transmitter transmits the bubble packet according to the destination data.

3. The information processing device according to one of claim 1 and claim 2 further comprising a type determination packet transmitter for transmitting a  
25       type determination packet through the communications processing device, the type determination packet being a packet used for determining a type of the communications processing device.

4. The information processing device according to claim 3 further comprising:

5 a type determination port data receiver for receiving a type determination port data defined as information indicating a position of a port of the communications processing device where the type determination packet passed through; and

a type determiner for determining a type of the communications processing device according to the type determination port data, wherein

10 the detecting packet transmitter transmits the detecting packet based on the type of the communications processing device determined by the type determiner.

5. The information processing device according to one of claim 1 and claim 2  
15 further comprising a type data receiver for receiving a type data defined as information indicating a type of the communications processing device, wherein

the detecting packet transmitter transmits the detecting packet according to the type of the communications processing device indicated by the type data.

20 6. The information processing device according to one of claim 1 and claim 2 further comprising:

a bubble packet transmission port receiver for receiving a bubble packet transmission port data defined as information indicating a position of a bubble packet transmission port detected based on the detecting packet; and

25 an output unit for outputting the bubble packet transmission port data.

7. The information processing device according to one of claim 1 and claim 2

further comprising:

a detecting port data receiver for receiving a detecting port data defined as information indicating a position of a port of the communications processing device where the detecting packet passed through;

5 a bubble packet transmission port detector for detecting a position of the bubble packet transmission port according to a type of the communications processing device and the detecting port data; and

an output unit for outputting a bubble packet transmission port data defined as information indicating the position of the bubble packet transmission  
10 port detected by the bubble packet transmission port detector.

8. The information processing device according to one of claim 1 and claim 2, wherein

the detecting packet transmitter transmits detecting packets in a manner  
15 that a port of the communications processing device where at least one of the detecting packets passes through is the same as the bubble packet transmission port if the communications processing device is of cone type, and in a manner that the port of the communications processing device where the detecting  
20 packets passes through is different from the bubble packet transmission port if the communications processing device is of symmetric type.

9. The information processing device according to one of claim 1 and claim 2, wherein

the detecting packet transmitter transmits the detecting packet by using  
25 the same port as a port of the information processing device where the bubble packet is transmitted from, before or after transmission of the bubble packet if the communications processing device is of cone type.

10. The information processing device according to one of claim 1 and claim 2, wherein

the detecting packet transmitter repeats transmitting the detecting packet  
5 from a different port of the information processing device than ports used before for transmission of the prior packets until a position of the port, which is a first port, of the information processing device from which the detecting packet is transmitted matches with a position of a port, which is a second port, of the communications processing device where the same packet passes through if the  
10 communications processing device is of port reuse type, and

the bubble packet transmitter transmits the bubble packet from the first port used for transmitting the detecting packet when the position of the first port matches with the position of the second port.

15 11. The information processing device according to one of claim 1 and claim 2, wherein

the detecting packet transmitter transmits the detecting packet by using the same port as a port of the information processing device where the bubble packet is transmitted from, before or after transmission of the bubble packet if  
20 the communications processing device is of port reuse type.

12. The information processing device according to one of claim 1 and claim 2, wherein

the detecting packet transmitter transmits detecting packets before and  
25 after transmission of the bubble packet, each from a different port in a manner that one of the detecting packets is transmitted from the same port used by the bubble packet transmitter for transmitting the bubble packet.

13. The information processing device according to one of claim 1 and claim 2, wherein

the detecting packet transmitter transmits detecting packets before and  
5 after transmission of the bubble packet if the communications processing device is of symmetric type.

14. The information processing device according to claim 13, wherein

the detecting packet transmitter transmits the detecting packet by using a  
10 newly allocated port in the information processing device if the communications processing device is of symmetric type.

15. The information processing device according to claim 12, wherein

the bubble packet transmitter transmits the bubble packet again if a  
15 position of the bubble packet transmission port cannot be detected,

the detecting packet transmitter transmits the detecting packet again if a position of the bubble packet transmission port cannot be detected, and

the retransmitted bubble packet and detecting packet are routed through a newly allocated port in the communications processing device.

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16. The information processing device according to one of claim 1 and claim 2 further comprising a port number differential detecting packet transmitter for transmitting a port number differential detecting packet via the communications processing device, the port number differential detecting  
25 packet defined as a packet used for detecting a port number differential of the communications processing device, wherein

a position of the bubble packet transmission port is detected by using a port

number differential of the communications processing device detected according to a position of a port of the communications processing device where the port number differential detecting packet passed through.

5        17. A port detecting device comprising:

a detecting port data receiver for receiving a detecting port data defined as information indicating a position of a port of the communications processing device of claim 1 where a detecting packet transmitted from the information processing device of claim 1 passed therethrough; and

10       a bubble packet transmission port detector for detecting a position of the bubble packet transmission port according to a type of the communications processing device and the detecting port data.

18. The port detecting device according to claim 17 further comprising an  
15       output unit for outputting a bubble packet transmission port data defined as information indicating the position of the bubble packet transmission port detected by the bubble packet transmission port detector.

19. An information processing method for making communications through  
20       a communications processing device handling the communications, the method comprising the steps of:

transmitting a bubble packet via the communications processing device, the bubble packet being a packet for leaving a transmission history within the communications processing device; and

25       transmitting a detecting packet via the communications processing device, the detecting packet being a packet used for detecting a position of a bubble packet transmission port defined as one of ports of the communications



processing device used for transmitting the bubble packet, the detecting packet transmitted in a manner that a detecting packet transmission port where the detecting packet passes through becomes the same as or different from the bubble packet transmission port, depending on a type of the communications  
5 processing device.

20. A port detecting method comprising the steps of:  
receiving a detecting port data defined as information indicating a position of a port of a communications processing device where the detecting packet  
10 transmitted in the information processing method of claim 19 passed therethrough; and

detecting a position of the bubble packet transmission port according to a type of the communications processing device and the detecting port data.

15 21. A program for a computer to execute communications through a communications processing device handling the communications, the program directing the computer to perform the steps of:

transmitting a bubble packet via the communications processing device, the bubble packet being a packet for leaving a transmission history within the  
20 communications processing device; and

transmitting a detecting packet via the communications processing device, the detecting packet being a packet used for detecting a position of a bubble packet transmission port defined as one of ports of the communications processing device used for transmitting the bubble packet, the detecting packet  
25 transmitted in a manner that a detecting packet transmission port where the detecting packet passes through becomes the same as or different from the bubble packet transmission port, depending on a type of the communications

processing device.

22. A program for directing a computer to perform the steps of:

5 receiving a detecting port data defined as information indicating a position  
of a port of a communications processing device where the detecting packet  
transmitted in the information processing method of claim 19 passed  
therethrough; and

detecting a position of the bubble packet transmission port according to a  
type of the communications processing device and the detecting port data.

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